

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

TOWNSEND, Victoria, Jayne
Fry Heath & Spence
The Old College
53 High Street
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ROYAUME-UNI

Date of mailing (day/month/year) 19 June 2001 (19.06.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P57783V	
International application No. PCT/GB00/03117	International filing date (day/month/year) 14 August 2000 (14.08.00)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address MADDISON, Victoria, Jayne Fry Heath & Spence The Old College 53 High Street Horley Surrey RH6 7BN United Kingdom	State of Nationality	State of Residence
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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address TOWNSEND, Victoria, Jayne Fry Heath & Spence The Old College 53 High Street Horley Surrey RH6 7BN United Kingdom	State of Nationality	State of Residence
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	Facsimile No. 44 1293 77 68 37	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Christine Carrié Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 10 April 2001 (10.04.01)	
International application No. PCT/GB00/03117	Applicant's or agent's file reference P57783V
International filing date (day/month/year) 14 August 2000 (14.08.00)	Priority date (day/month/year) 17 August 1999 (17.08.99)
Applicant COOKE, Robert, Stephen et al	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

12 February 2001 (12.02.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Pascal Piriou Telephone No.: (41-22) 338.83.38
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REC'D 27 SEP 2001

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT


(PCT Article 36 and Rule 70)

Applicant's or agent's file reference ---	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/03117	International filing date (day/month/year) 14/08/2000	Priority date (day/month/year) 17/08/1999
International Patent Classification (IPC) or national classification and IPC A61B6/00		
Applicant ELEKTA ONCOLOGY SYSTEMS LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 12/02/2001	Date of completion of this report 25.09.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schießl, W Telephone No. +49 89 2399 7436



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03117

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-7 as originally filed

Claims, No.:

1-16 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03117

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☒ the entire international application.

☐ claims Nos. .

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

Section III

- 1 The various definitions of the subject-matter given in independent apparatus claims 1, 13, 15 and 16, each reciting a different combination of limitations expressed at different levels of generalizations, are such that the claims as a whole are not concise and clear (cf. PCT Guidelines PCT/GL/3 III, 5.1), contrary to the requirements of Article 6 PCT. More than one independent claim in the same category is permitted to be included in the same International Application only if the multiple independent claims have effectively the **same scope** (cf. PCT Guidelines PCT/GL/3 III, 3.2) or if it is **not appropriate** to cover the subject-matter by a single independent claim (PCT Guidelines PCT/GL/3 III, 3.3).

In the present application, however, the different combinations of features recited in the various independent claims do not allow to clearly identify "**the** claimed invention" on which an opinion should be based in the sense of Article 33.1 PCT. In particular, each of the independent claims 1 and 13 specify different apparatus for positioning an imaging device, whereas claims 15 and 16 both relate to an unspecified radiation therapy apparatus further including an apparatus according to claims 1-14 and 1-13, respectively.

- 2 The features of claim 13 are due to the vague and unclear reference to the description and drawings entirely unclear (PCT Guidelines PCT/GL/3 III, 4.10). The same applies to the radiation therapy apparatus as defined in claims 15 and 16 as no structural features of said therapy apparatus are given (accelerator?, brachytherapy seed?, cobalt source?, neutron reactor?).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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International Bureau



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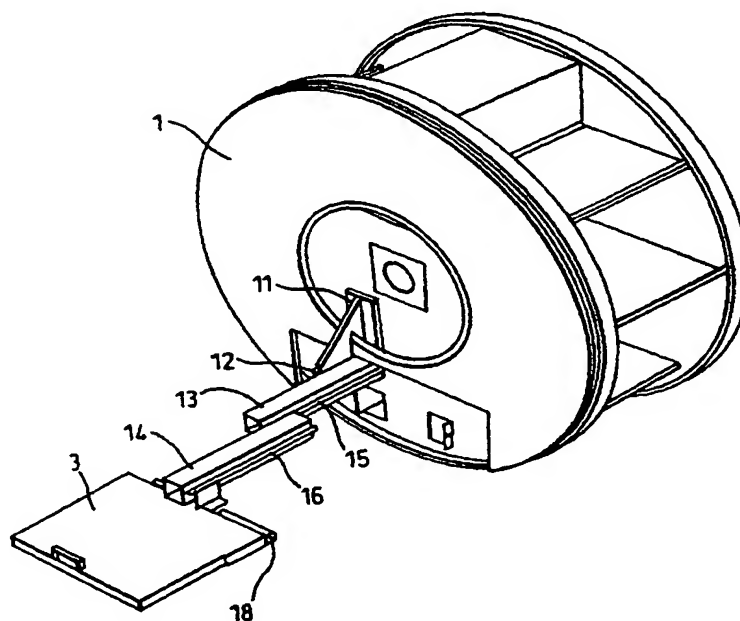
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9919274.2 17 August 1999 (17.08.1999) GB
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: PORTAL IMAGING DEVICE



(57) Abstract: A surface mountable apparatus is provided for positioning an imaging device relative to the gantry of a radiation therapy apparatus. The apparatus comprises a mounting device for mounting the apparatus on the gantry surface a telescopically extendable arm which is pivotally connected to the mounting device and a holder for holding an imaging device the holder being connected to the distal portion of the telescopically extendable arm. The apparatus is mechanically simple and relatively inexpensive to manufacture. The apparatus when assembled to a radiation therapy apparatus provides an accurate and lightweight means of positioning and stowing an imaging device.

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IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *Without international search report and to be republished upon receipt of that report.*

PORTAL IMAGING DEVICE

This invention relates to radiation treatment apparatus, in particular portal imaging systems comprising a rotatable gantry, supported by a stand, a radiation emitting head coupled to the gantry and an imaging device for providing, in visual form, a representation of the radiation beam emitted from the head after it has passed through the object under treatment. In particular the invention relates to apparatus for mounting the imaging device on the gantry of the radiation treatment apparatus.

European Patent No. EP 0541717 identifies a problem with portal imaging devices, that being that in order for the lightweight boxes to cover a reasonable radiation field size, the construction of the detector enclosure has to be very bulky, this poses an inconvenience during patient set up and occupies space in the treatment room when not being used. Practical use of such devices has thus, historically been quite limited. That Patent goes on to describe an apparatus for mounting the imaging device to the gantry of a radiation treatment apparatus in which the imaging device is fixed to the end of a telescopically extendable holding means the holding means being arranged such that when not in use the majority of the holding apparatus and imaging device is retracted into the body of the gantry.

Whilst this arrangement provides a convenient means of storing the imaging device and associated mounting apparatus, the mounting apparatus is integral with the gantry of the radiation treatment apparatus and must therefore be built into the apparatus during manufacture. Additional disadvantages of this arrangement arise where parts of the mounting apparatus require repair maintenance or replacement. The arrangement also requires that space be found in the body of an already cumbersome piece of equipment to locate the collapsed mounting means.

Alternative mounting apparatus have been proposed which are surface mountable on the gantry of the radiation treatment apparatus. These arrangements

comprise an arm for holding the imaging device which is collapsible about one or more pivots. The arm itself is pivotally mounted on the surface of the gantry of the treatment apparatus and the imaging device is pivotally connected to the distal end of the arm the arrangement being such that the entire assembly can be folded flat to sit flush against the surface of the gantry.

In order to produce an accurate visual representation of the image it is essential that the imaging device is positioned and maintained in position accurately at a predetermined distance from the radiation emitting head. Thus, foldable mounting apparatus such as that described, is extremely difficult and expensive to engineer in practice and not always as accurate as may be desired.

It is therefore an object of the present invention to provide a mounting apparatus for mounting the imaging device on the gantry which alleviates some or all of the aforementioned disadvantages associated with the previously described mounting apparatus.

In accordance with the present invention there is provided apparatus for positioning an imaging device relative to the gantry of a radiation therapy apparatus comprising:

a mounting device for mounting the apparatus onto the gantry surface, a telescopically extendable arm pivotally connected to the mounting device, and a holder for holding an imaging device, the holder being connected to the telescopically extendable arm.

Conveniently, the arm may comprise two or more elongate elements arranged in slidable communication with each other. Optionally, the slidable communication is provided by means of one or more linear bearings located between the elongate elements. The elongate elements may optionally be arranged to slide one inside another or alternatively side by side. To provide optimum stability, the arm is preferably pivotally mounted substantially about its centre of mass. Most preferably the arm is

pivotally mounted substantially about the centre of mass of the arm and imaging device assembly.

Optionally, the holder is slidably mounted to slide along the extendable arm. This arrangement provides for more compact retraction of the arm and image device assembly as well as more freedom in positioning the image device relative to the radiation head. The holder may further comprise means for permitting linear motion of the imager device along an axis perpendicular to the longitudinal axis of the extendable arm. This arrangement provides a further degree of freedom in positioning the imaging device with respect to the radiation emitting head and when provided along with a slidably mounted holder provides for the imaging device to be easily locatable about a relatively large area.

As a further option, the apparatus may be provided with means for moving the image device radially along the surface of the gantry, toward and away from its centre point. Such means may comprise, for example, a slider on the surface of the gantry or a pivot and linkage system connecting the components of the apparatus.

Preferably the holder is detachable from the imaging device, permitting the imaging device to be removed for storage or replacement. Preferably, the holder has means for locking the position of the imaging device when the device is located within the holder.

In order to permit a further degree of freedom in positioning the imaging device, the holder may optionally comprise a rotating means for rotating the imaging device about an axis parallel to the longitudinal axis of the extending arm.

Preferably the apparatus is provided with counterbalancing means such that the arm and/or the arm and image device assembly can be held under gravity in any given angular position relative to the surface of the gantry.

Optionally, the apparatus may be activated by mechanical means, in particular,

where the apparatus is provided with counterbalancing means, the sliding and rotational movements may be actuated by a simple lower power means.

Thus it can be seen that the invention provides a mechanically simple and inexpensive means of positioning an imaging device relative to the gantry of a radiation therapy apparatus. As the arrangement is surface mountable it can be fixed to existing equipment and can easily be maintained repaired or replaced. Apparatus according to the invention will operate at any given positional rotation of the gantry. Thus, two or more apparatus according to the present invention may be provided on any single given gantry of the radiation therapy apparatus. For example, two such apparatus may be disposed at two positions about the gantry of a radiation therapy apparatus a first position being commensurate with a megavolt measurement of the radiation image and the second position being commensurate with a kilovolt measurement of the radiation image. In this arrangement where the holder of the apparatus is provided to be detachable from the imaging device, a single imaging device may be transferred between the two apparatus according to the present invention to obtain both megavolt and kilovolt measurements.

A particular advantage of this arrangement is provided where the pivot about which the arm is mounted is offset from the end of the arm, this enables the arrangement to be self counter balancing when retracted and minimises any movement about the arm when extended. The inherent stability of this arrangement means that the forces to be overcome on extension and retraction are primarily frictional or inertial and can easily be overcome either manually or with simple electro-mechanical actuation devices.

It is also to be appreciated that the small framed lightweight arrangement is easy to manoeuvre around even when partially stowed.

The invention will now be further described by way of example with reference to the Figures, in which:-

Figure 1 shows an apparatus for positioning an imaging device relative to the gantry of radiation therapy apparatus substantially as described in European Patent EP 0541717;

Figure 2 shows a schematic of the surface mountable folding apparatus also described above;

Figure 3 shows an embodiment of the present invention in its fully extended position in both a perspective and side view;

Figure 4 shows the embodiment of Figure 3 in a partially retracted position;

Figure 5 shows the embodiment of Figure 3 with the arms and imaging device fully retracted;

Figure 6 shows how the fully retracted arm and imaging device rotate about a centre of mass to be stowed flat against the gantry surface;

Figure 7 illustrates the embodiment of Figure 3 in a fully stowed and retracted position in both a perspective and side view;

Figure 8 shows how the embodiment can operate at an alternative gantry rotation.

In Figure 1 a gantry 1 of a radiation therapy apparatus is provided with a radiation head 2 and diametrically opposed to the radiation head is an imaging device 3 connected to a telescopic arm 4, 5 which is retractable into a cavity 6 within the gantry 1. The arm comprises two concentrically aligned tubes 4, 5 slidable one within the other along an axis A. Imaging device 3 is pivotally mounted about a point 7 to the distal end of tube 4. The arrangement is shown in fully extended position, but it can be seen that retraction of tube 4 along tube 5 into cavity 6 and pivoting of imaging device 3 about pivot 7 allows the assembly to be retracted and stowed in a position

flush with the surface of the gantry 1 of the radiation therapy apparatus.

In Figure 2 the gantry 1 of a radiation therapy apparatus has pivotally connected thereto a jointed arm 8, 9 which is further connected to an imaging device 3 about a pivotal joint 10. Figure 2a shows the arrangement partially extended and Figure 2b shows the arrangement fully retracted.

In Figure 3, a gantry 1 of a radiation therapy apparatus has fixed thereto a mounting plate 11 to which, by means of pivot 12, telescopically extending arm 13, 14 is attached. The telescopically extending arm comprises two tubes, 13 and 14, which in this embodiment are of substantially rectangular cross-section but may be of any other suitable cross-section arranged to slide side by side by means of linear bearing 15. Slidably connected to the distal portion 14 of the slidable arm is an imaging device holder 17 which is slidable along linear bearing 16. Mounted on the holder 17 is an imaging device 3. Imaging device 3 is slidable with respect to holder 17 by means of linear bearing 18.

As can be seen from the Figure the imaging device 3 is free to move along two perpendicular axes defined by linear bearings 16 and 18.

In Figure 4, the distal portion 14 of the extendable arm 13, 14 has been moved towards the surface of gantry 1 by means of linear bearing 15. Movement of the slidable arm 14 in linear bearing 15 together with movement of linear bearing 18 of holder 17 allows the imaging device 3 to be locatable about a relatively large viewing area.

In Figure 5 holder 17 has been moved from a relatively distal to a relatively proximal position on the extendable arm 13, 14 drawing the imaging device 3 closer to the surface of the gantry 1. This partially retracted position provides more convenient access to the patient during treatment.

Figure 6 illustrates how the apparatus, fully retracted as shown in Figure 5, can

be pivoted about pivot 12 towards a stowing position substantially flush with the surface of gantry 1.

Finally, Figure 7 illustrates the apparatus in fully stowed position.

The foregoing describes only one embodiment of the invention to aid understanding and is not intended to be in any way limiting from the true scope of the invention as defined in the appended claims.

CLAIMS

1. Apparatus for positioning an imaging device relative to the gantry of a radiation therapy apparatus comprises a mounting device for mounting the apparatus on the gantry surface, a telescopically extendable arm pivotally connected to the mounting device and a holder for holding an imaging device, the holder being connected to the distal portion of the telescopically extendable arm.
2. Apparatus as claimed in claim 1 wherein the arm comprises two or more elongate elements in slidable communication with each other.
3. Apparatus as claimed in claim 2 wherein the slidable communication is provided by one or more linear bearings between the elongate elements.
4. Apparatus as claimed in claim 2 or claim 3 wherein the elongate elements do not share a common central axis.
5. Apparatus as claimed in any preceding claim wherein the arm is pivotally mounted substantially about its centre of mass.
6. Apparatus as claimed in any one of claims 1 to 4 wherein the arm is pivotally mounted substantially about the centre of mass of the arm and imaging device assembly.
7. Apparatus as claimed in any preceding claim wherein the holder is slidably mounted to slide along the extendable arm.
8. Apparatus as claimed in any preceding claim wherein the holder comprises means for sliding the image device along an axis perpendicular to the longitudinal axis of the extendable arm.
9. Apparatus as claimed in any preceding claim wherein the holder is detachable

from the imaging device and/or the extendable arm.

10. Apparatus as claimed in any preceding claim wherein the holder comprises means for locking the position of the imaging device.
11. Apparatus as claimed in any preceding claim further comprising means for rotating the imaging device about an axis parallel to longitudinal axis of the extendable arm.
12. Apparatus as claimed in any preceding claim comprising a counterbalancing means for holding the extendable arm under gravity in any given angular position relative to the surface of the gantry.
13. Apparatus substantially as described herein with reference to Figures 2 to 8.
14. Apparatus as claimed in any preceding claim wherein the apparatus is actuated by mechanical or electro-mechanical means.
15. A radiation therapy apparatus comprising apparatus for positioning an imaging device substantially as described in any preceding claim.
16. A radiation therapy apparatus comprising two or more apparatus as claimed in any one of claims 1 to 13.

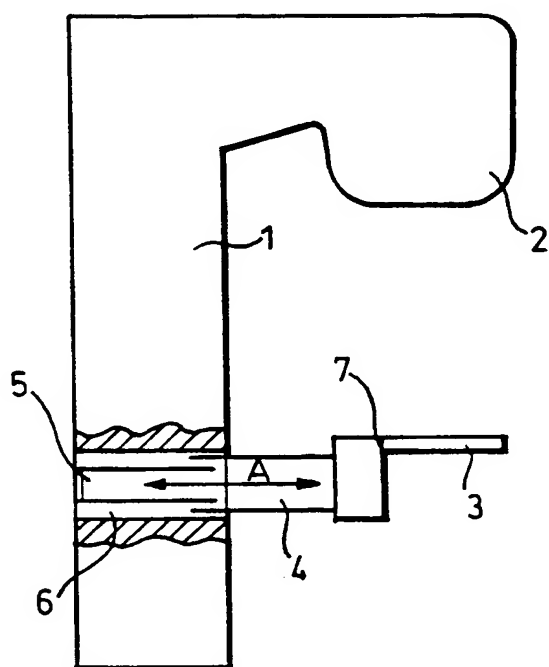


Fig.1.

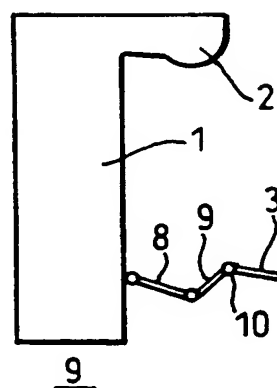


Fig.2a.

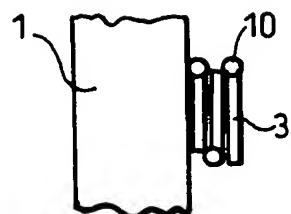


Fig.2b.

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Fig.3a.

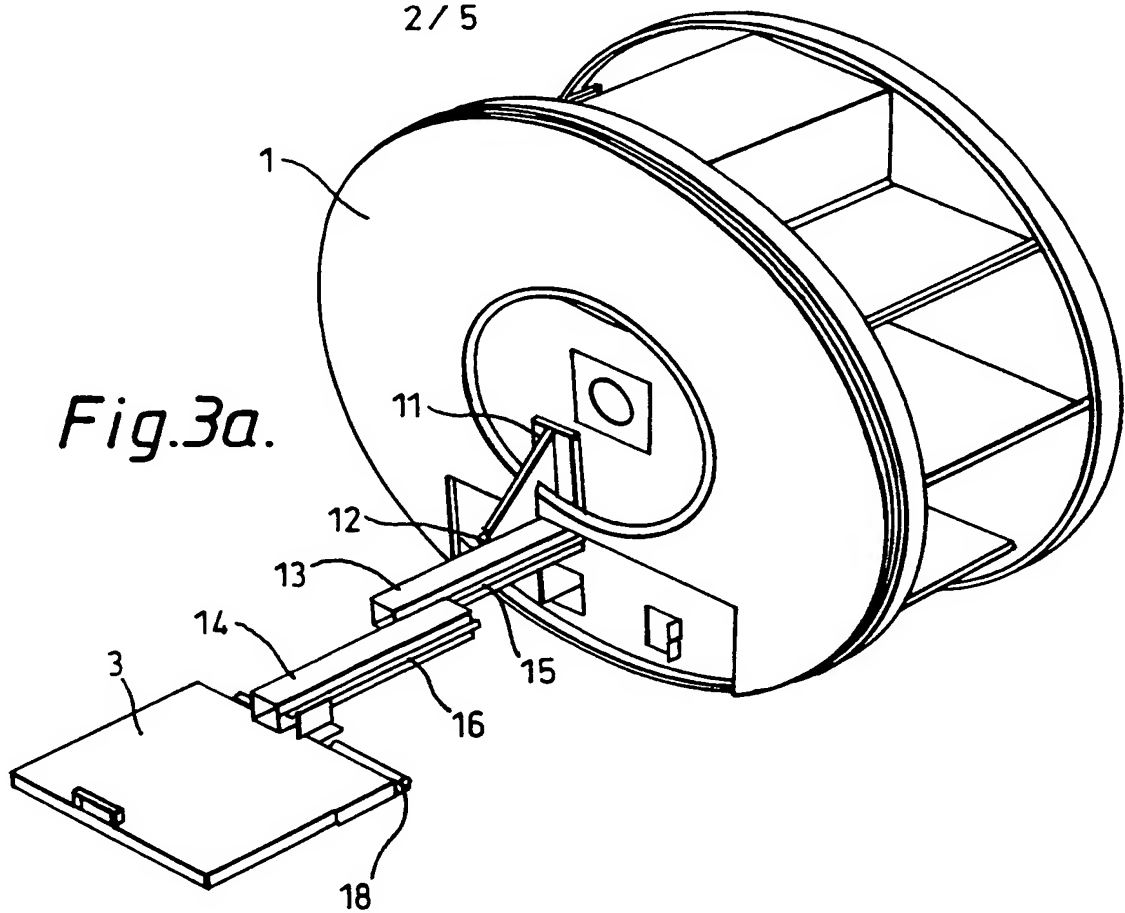
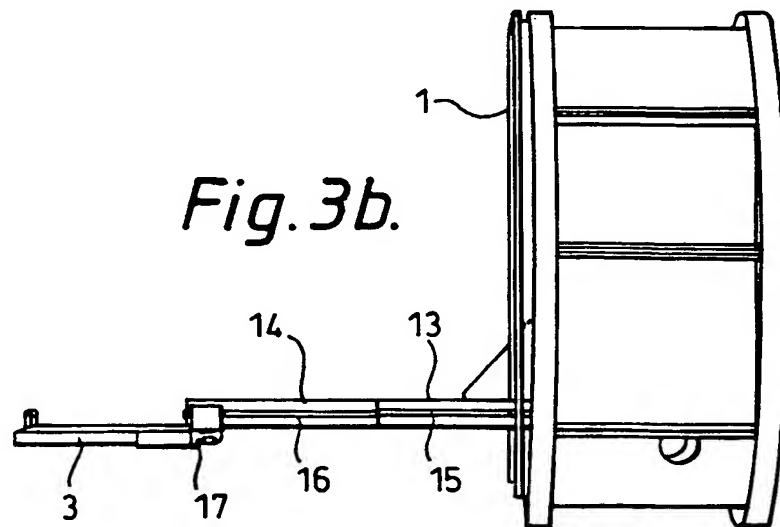


Fig.3b.



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Fig.4.

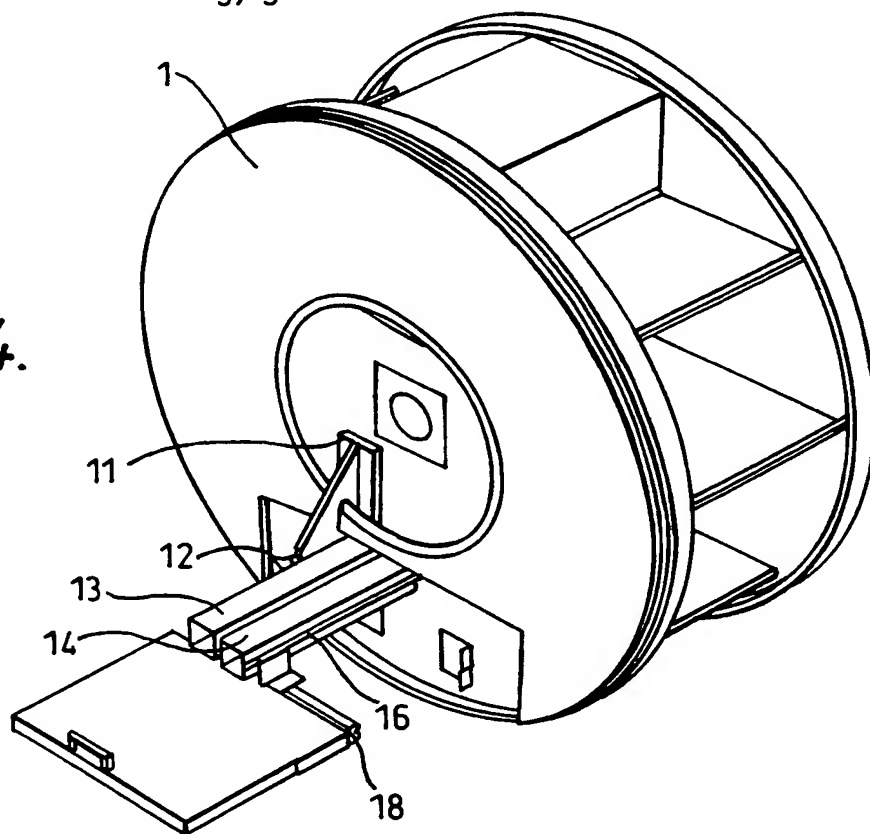
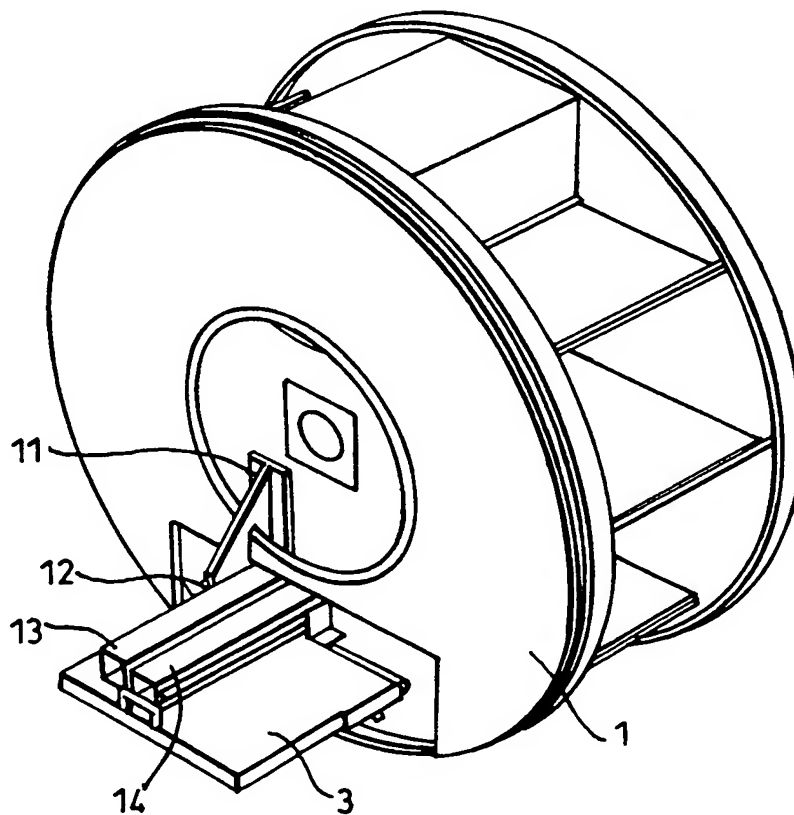


Fig.5.



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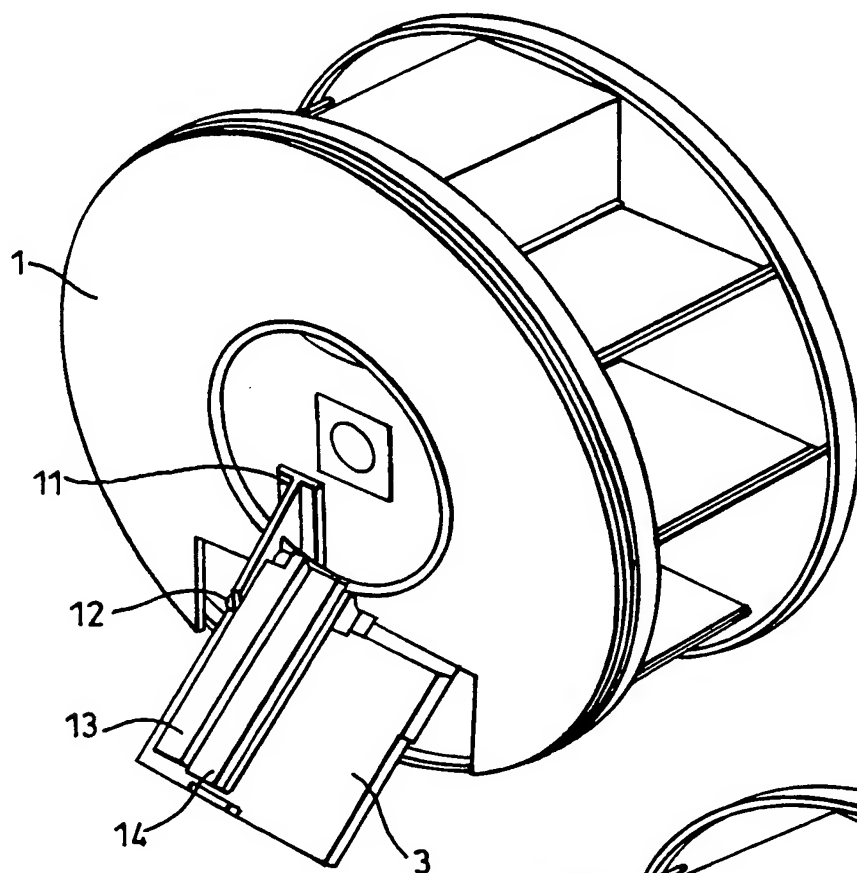


Fig. 6.

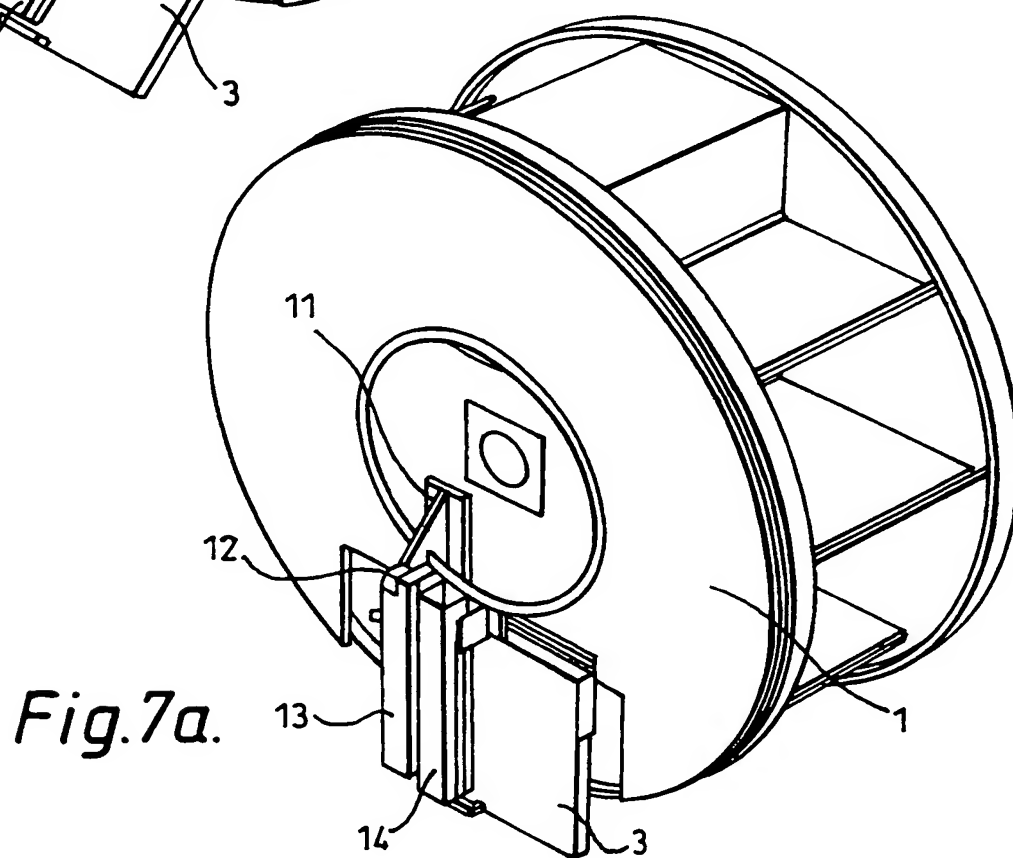


Fig. 7a.

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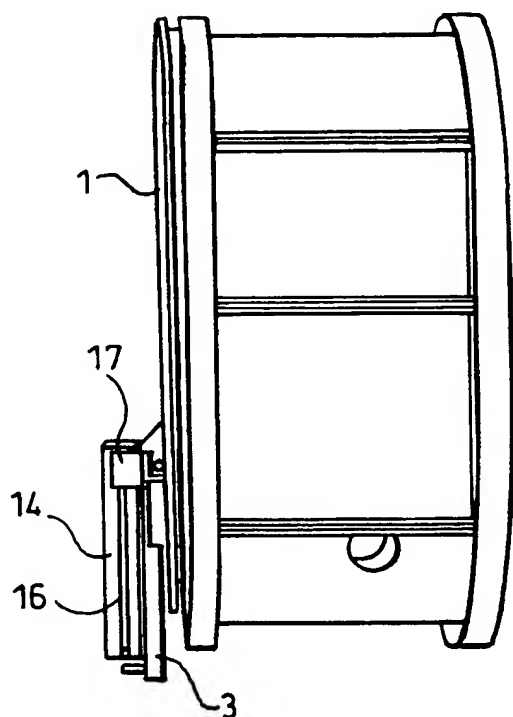


Fig. 7b.

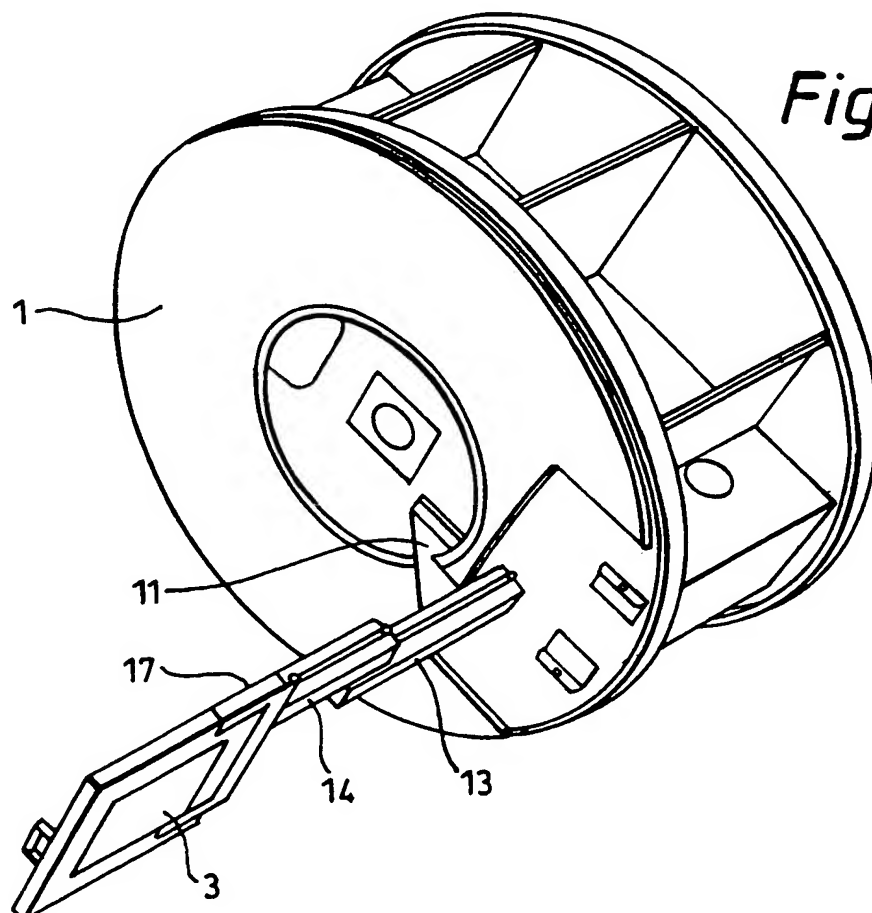


Fig. 8.

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International Bureau



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9919274.2 **17 August 1999 (17.08.1999)** **GB**

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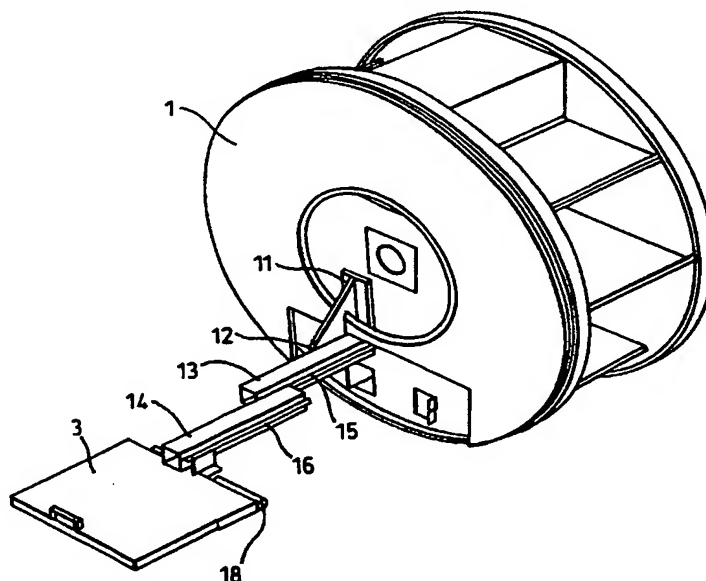
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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: **PORTAL IMAGING DEVICE**



(57) Abstract: A surface mountable apparatus is provided for positioning an imaging device (3) relative to the gantry (1) of a radiation therapy apparatus. The apparatus comprises a mounting device (11) for mounting the apparatus on the gantry surface a telescopically extendable arm (13, 14) which is pivotally connected to the mounting device (11) and a holder (17) for holding an imaging device (3) the holder (17) being connected to the distal portion (14) of the telescopically extendable arm. The apparatus is mechanically simple and relatively inexpensive to manufacture. The apparatus when assembled to a radiation therapy apparatus provides an accurate and lightweight means of positioning and stowing an imaging device.



WO 01/12066 A3

WO 01/12066 A3



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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7 June 2001

Published:

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

In ational Application No

PCT/GB 00/03117

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B6/00 A61N5/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 919 186 A (PICKER INTERNATIONAL, INC.) 2 June 1999 (1999-06-02) column 5, line 8 - column 6, line 28 column 7, line 34 - column 8, line 16 column 11, line 53 - column 12, line 38 figures 1,2,4,21	1, 15, 16
A	---	7, 8
X	WO 96 03077 A (AO MEDICAL PRODUCTS AB) 8 February 1996 (1996-02-08) page 8, line 30 - page 15, line 4 figures	1, 13, 15, 16
A	---	2-6, 10, 11, 14
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

21 February 2001

Date of mailing of the international search report

28/02/2001

Name and mailing address of the ISA

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Chen, A

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/03117

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 196 40 048 A (SIEMENS AG) 9 April 1998 (1998-04-09) column 1, line 40 -column 2, line 44 ----	1,2,5,6, 11-13, 15,16
A	US 4 995 068 A (CHOU ET AL.) 19 February 1991 (1991-02-19) column 3, line 32 -column 5, line 52 figures 1-4 ----	1,2,13, 15,16
A	US 5 631 943 A (MILES) 20 May 1997 (1997-05-20) column 4, line 21 - line 47 column 7, line 49 -column 8, line 23 figures 1,5-7 ----	1,2,10
A	EP 0 631 088 A (TROPHY RADIOLOGIE) 28 December 1994 (1994-12-28) page 1, line 27 -page 4, line 7 figure 1 -----	5,6,12

INTERNATIONAL SEARCH REPORT

Information on patent family members

In International Application No

PCT/GB 00/03117

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 919186	A	02-06-1999	US 6031888 A	29-02-2000
			JP 11262485 A	28-09-1999
WO 9603077	A	08-02-1996	SE 503047 C	18-03-1996
			AU 3090595 A	22-02-1996
			EP 0774920 A	28-05-1997
			FI 970335 A	27-01-1997
			NO 970331 A	24-01-1997
			SE 9402589 A	29-01-1996
			US 5764724 A	09-06-1998
DE 19640048	A	09-04-1998	JP 10108860 A	28-04-1998
US 4995068	A	19-02-1991	NONE	
US 5631943	A	20-05-1997	AU 715394 B	03-02-2000
			AU 1285597 A	14-07-1997
			CA 2241130 A	26-06-1997
			EP 0972430 A	19-01-2000
			JP 2000501973 T	22-02-2000
			US 6038287 A	14-03-2000
			WO 9723120 A	26-06-1997
			US 5781610 A	14-07-1998
EP 631088	A	28-12-1994	FR 2706980 A	30-12-1994

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27 SEP 2001

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

To:

TOWNSEND, Victoria, J.
FRY HEATH & SPENCE
The Old College
53 High Street
Horley, Surrey RH6 7BN
GRANDE BRETAGNE

Date of mailing
(day/month/year) 25.09.2001

Applicant's or agent's file reference

P57783 ✓

IMPORTANT NOTIFICATION

International application No.
PCT/GB00/03117

International filing date (day/month/year)
14/08/2000

Priority date (day/month/year)
17/08/1999

Applicant

ELEKTA ONCOLOGY SYSTEMS LTD. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference ---	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/03117	International filing date (<i>day/month/year</i>) 14/08/2000	Priority date (<i>day/month/year</i>) 17/08/1999	
International Patent Classification (IPC) or national classification and IPC A61B6/00			
Applicant ELEKTA ONCOLOGY SYSTEMS LTD. et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 12/02/2001	Date of completion of this report 25.09.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Schießl, W Telephone No. +49 89 2399 7436 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03117

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-7 as originally filed

Claims, No.:

1-16 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/03117

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☒ the entire international application.

☐ claims Nos. .

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03117

Section III

- 1 The various definitions of the subject-matter given in independent apparatus claims 1, 13, 15 and 16, each reciting a different combination of limitations expressed at different levels of generalizations, are such that the claims as a whole are not concise and clear (cf. PCT Guidelines PCT/GL/3 III, 5.1), contrary to the requirements of Article 6 PCT. More than one independent claim in the same category is permitted to be included in the same International Application only if the multiple independent claims have effectively the **same scope** (cf. PCT Guidelines PCT/GL/3 III, 3.2) or if it is **not appropriate** to cover the subject-matter by a single independent claim (PCT Guidelines PCT/GL/3 III, 3.3).

In the present application, however, the different combinations of features recited in the various independent claims do not allow to clearly identify "the claimed invention" on which an opinion should be based in the sense of Article 33.1 PCT. In particular, each of the independent claims 1 and 13 specify different apparatus for positioning an imaging device, whereas claims 15 and 16 both relate to an unspecified radiation therapy apparatus further including an apparatus according to claims 1-14 and 1-13, respectively.

- 2 The features of claim 13 are due to the vague and unclear reference to the description and drawings entirely unclear (PCT Guidelines PCT/GL/3 III, 4.10). The same applies to the radiation therapy apparatus as defined in claims 15 and 16 as no structural features of said therapy apparatus are given (accelerator?, brachytherapy seed?, cobalt source?, neutron reactor?).